# User manual

## Wireline WL103/80

**Doc. no.: WL103/80e.02**

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# 1. Introduction

The Sandvik Wireline System (WL) is available in dimensions of 46, 56, 66, 76 and 103 mm. The 66, 76 and 103 mm dimensions include a triple variant with an extra inner tube.

**Table 1: Different Wireline Systems**

| System | Hole dimension | Core dimension | Corearea in % of hole area | Tube ext./int. dim. | Tube weight kg/m |
|---|---|---|---|---|---|
| WL46 | Ø47.0 | Ø28.8 | 37.5 | Ø43.2/35.2 | 3.9 |
| WL56/39 | Ø56.8 | Ø39 | 47.1 | Ø53.2/45.2 | 4.9 |
| WL56/42 | Ø56.8 | Ø41.2 | 52.6 | Ø53.2/47.2 | 3.8 |
| B60 | Ø60 | Ø39 | | Ø55.6/46 | 6.0 |
| WL66 | Ø67.1 | Ø50.5 | 56.6 | Ø63.9/57.0 | 5.1 |
| WL66-3 | Ø67.1 | Ø45 | 47.0 | Ø63.9/57.0 | 5.1 |
| WL76 | Ø76.3 | Ø57.5 | 56.8 | Ø73.2/64.4 | 7.5 |
| WL76-3 | Ø76.3 | Ø51 | 44.7 | Ø73.2/64.4 | 7.5 |
| WL103 | Ø102.8 | Ø80 | 60.9 | Ø98/88.8 | 10.6 |

# 1.1 Description

For recovery in drill holes inclined at an angle of more than 60° from the horizontal plane there is a free falling overshot (see chapter “Free Falling Overshot” on page 16).

The WL core barrels are available in lengths of 1.5 and 3.0 m.

Drill bits for WL103 are manufactured as standard with an external diameter of 102.5 and reaming shell of 102.8 mm.

**Remark**

**When drilling with an oversize bit and reaming shell an oversized drill rod connection should be used.**

# 2. Safety Instructions

**WARNING**

**When handling Wireline it is important to inspect the wire visually, since a broken wire can cause injury to personnel or damage the equipment. When the wire starts to look damaged it should be shortened.**

**WARNING**

**There is a risk of injury from the wire during Wireline drilling. This risk is greatest between the Wireline windlass and the top of the mast. Do NOT enter this area when the wire is in operation. There is also a risk of getting trapped round the drum, in the wire spreader on the drum, and at the pulley on the mast. Remember that the wire can split up, which can lead to severe cut injuries. Never grip the wire when it is in motion.**

**WARNING**

**When handling Wireline the inner tube can release on detachment and come sliding out of the hole at high speed.**

**WARNING**

**When the core barrel is emptied from the drill bit there is a risk of injuring the hands and fingers. The core can come sliding out from the core barrel at high speed. NEVER place the hands and fingers under the core barrel, place them is such a way that the core can pass without causing injury.**

**WARNING**

**The drill rods are exposed to a higher load and heavier vibrations during upward drilling. The risk of drill rods braking when they are worn is therefore increased. If the rods break during the drilling the rod holder will be open, which causes the rod string to slide out from the hole. For this reason, place the panel at a safe distance from the barrier.**

**WARNING**

**The risk of injury increases more than normal during upward drilling.**

**WARNING**

**Cuff wrenches must under NO CIRCUMSTANCES be used on the rods when they are rotated by means of the machine. They can come loose and injure the operator, or cause pinch injuries on the hands and fingers.**

**WARNING**

**Remember to secure the machine in a reliable manner when it is anchored to the rock. Make sure to inspect the attachment during operation to make sure the machine does not come loose.**

**WARNING**

**Remember that you should have the opportunity to reach, or have regular contact with those around you if you should become injured when using the machine.**

# 2.1 Recommendations

- Check the threads on the drill rods regularly. If the threads are damaged they can damage other rods they are attached to. Pay extra attention to the water swivel tube.
- Make sure that the threads are properly engaged with each other before the rods are screwed together by means of the machine.
- Make sure that the rod does not break during threading (rod support and guides).
- Make sure to lubricate the threads.

**Note**

**Always lubricate the drill rod threads with grease that is suitable for high pressure. Special thread lubricant is best.**

- Avoid rotating so fast that the threads are “knocked” together.
- Check that the threads are free from dirt and undamaged.
- Avoid too many tough shapening. Use a lower water flow instead for hard rock.
- Make sure that lifting function on the machine functions during the rod threading, and that the “float position” works.
- If the threading on one rod should get damaged during making of joint, both rods should be replaced.

# 2.2 Wire Handling

## 2.2.1 Winding of wire

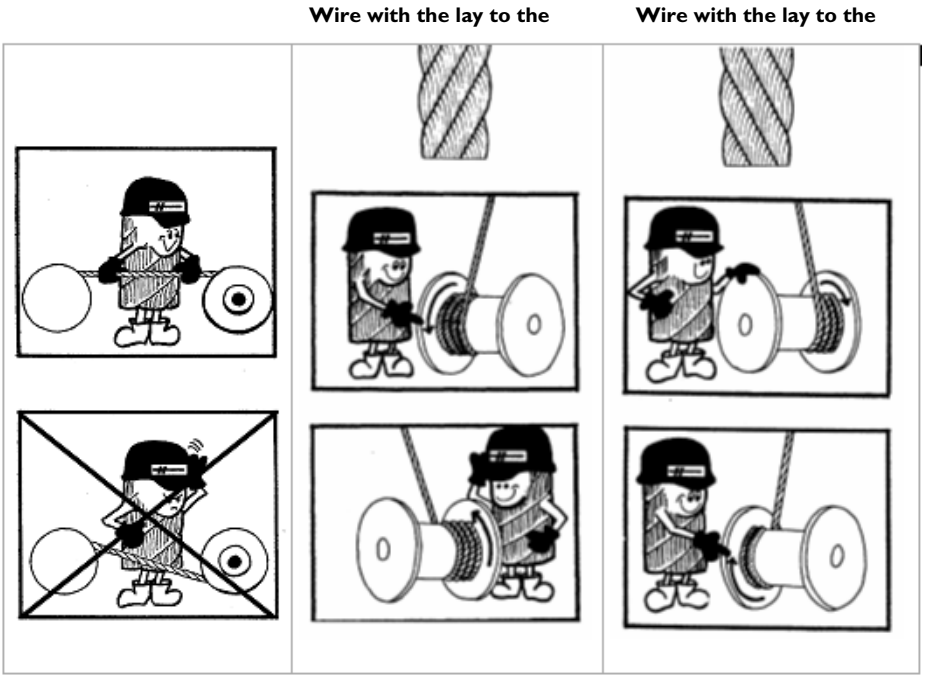


**Figure 1. Wire handling**

# 3. Outer Core Barrel, complete

The numbers bellow, in brackets, correspond against the numbers in table “List of spare parts, Outer Core Barrel” on page 9.

The core barrel drill rod adaptor (1) has tungsten carbide inserts so that it can be guided up and therefore minimize the hole deviation.

## 3.1 Fitting of Outer Core Barrel

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The outer landing ring (LY) (4) is fitted in the adapter tube’s (5) female thread, with the internal collar facing upwards.

The latch housing (3) locks the outer landing ring (4).

**Remark**

**The landing ring should be replaced after drilling approximately 500 m.**

The latching ring (2) is fitted on the latch housing’s (3) female thread.

The drill rod adaptor (1) locks the latching ring.

The latching ring can be reversed after a period of use if the edge has become worn.

The outer tubes are of standard lengths 1.5 m or 3.0 m.

On those occasions when the outer tube is taken up for inspection a careful check should be made that the outer landing ring and latching ring are in place and undamaged.

The inner tube is locked upwards in the outer tube in that the core barrel head latches support the latching ring. The inner tube is fixed downwards in that the outer landing ring has a smaller diameter than the core barrel head’s landing ring.

The tensile force when breaking the core is transferred from the core lifter case to the drill bit in that the inner tube connection is flexible in the axial plane (the core lifter case “rests” on the bit).

Before recovery the core is broken and the core barrel lifted 3-6 m. This prevents drill cuttings that drop back into the hole collecting inside the outer tube.

Freshing the inner tube to mismatch when sent back.



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# 3.2 List of spare parts – Outer Core Barrel

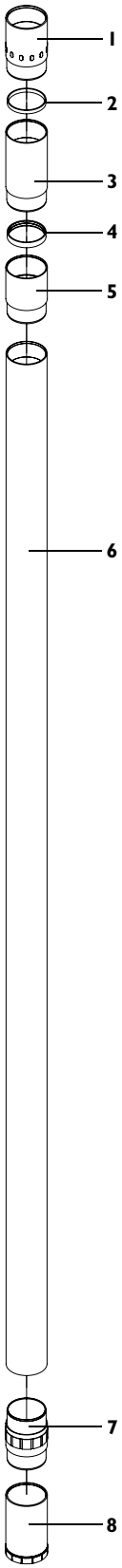



**Table 2: List of spare parts, Outer Core Barrel**

| No. | Quantity | Part | Remarks | Part no. |
|---|---|---|---|---|
| 1 | 1 | Drill rod adaptor, right-hand | | 601 222 770 |
| 2 | 1 | Latching ring | | 601 222 771 |
| 3 | 1 | Latch housing | | 601 222 772 |
| 4 | 1 | Outer landing ring | | 601 222 773 |
| 5 | 1 | Adaptor tube | L = 331 mm | 601 222 774 |
| 6 | * | Outer tube, 1.5 m | L = 1 608 mm | 501 220 285 |
| 6.1 | * | Outer tube, 3.0 m | L = 3 108 mm | 501 220 286 |
| 7 | 1 | Reaming shell | | |
| 8 | 1 | Drill bit | | |

# 4. Inner Core Barrel, complete

The numbers bellow, in brackets, correspond against the numbers in table “List of spare parts, Inner Core Barrel, complete” on page 11.

Always use cuff wrenches when working with the inner tube (2) and core lifter case (4). Check the function of the core lifter spring (3) after each recovery. If the inner tube is clamped oval, or otherwise damaged, the inner tube can stick in the drill rod or outer landing ring. A landing ring for the core barrel head can be used to check that the inner tube has not been deformed.

**Table 3: Estimated times for pumping in Inner Core Barrel**

| System | Volume drill rod | Speed with water flow of 40 l/min. | Time to 100 m with water flow of 40 l/min. |
|---|---|---|---|
| WL46/29 | 1.0 l/m | 40 m/min. | 2.5 min. |
| WL56/39 | 1.6 l/m | 25 m/min. | 4 min. |
| WL56/42 | 1.7 l/m | 24 m/min. | 4 min. |
| WL66/45 | 2.6 l/m | 16 m/min. | 6 min. |
| WL66/50.5 | | | |
| WL76/51 | 3.3 l/m | 12 m/min. | 8 min. |
| WL76/57.5 | | | |
| WL103 | 6.2 l/m | 7 m/min. | 15 min. |

The pumping in time for the inner core barrel is part of the total handling time. If the Sandvik System with pumping of the inner tube or lifter is used it is possible to obtain an indication of when they are in position. This ensures significant time savings since the drilling or recovery of the inner core barrel can be started immediately. How long the pumping takes depends on how much water can flow in the gap between the core barrel and hole wall. This time can be reduced by increasing the pressure of the water, or increasing the gap between the drill rod and hole wall. If the gap is increased between the drill rod and hole this increases the risk of deviated holes.

# 4.1 List of spare parts – Inner Core Barrel

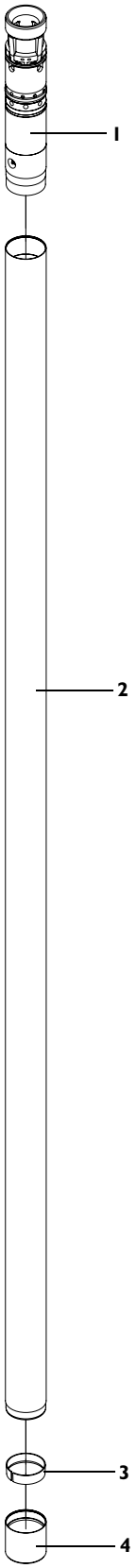
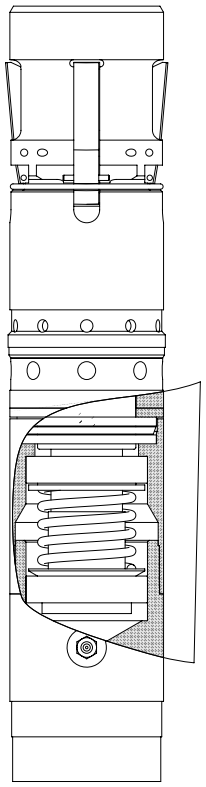



**Table 4: List of spare parts, Inner Core Barrel, complete**

| No. | Quantity | Part | Remarks | Part no. |
|---|---|---|---|---|
| 1 | 1 | Core barrel head | | 601 222 790 |
| 2 | 1 | Inner tube 1.5 m | L = 1 600 mm | 601 222 777 |
| 2.1 | 1 | Inner tube 3.0 m | L = 3 100 mm | 601 222 778 |
| 3* | 1 | Core lifter spring, standard | | 601 222 779 |
| 4 | 1 | Core lifter case | | 601 222 768 |

* Core lifter spring (3) can also be found in flatt mode (601 222 779-1).

# 5. Core Barrel Head



WL-29

Core barrel head has part no. 601 222 790.

The numbers bellow, in brackets, correspond against the numbers in table “List of spare parts, Core Barrel Head” on page 13.

Check that the latches (2) move freely and that the O-ring (1) and tubular pin (3, 4) are undamaged.

When checking the latches the lifter tip is inserted in the core barrel head. The back edge of the lifters should then be inside the outer dimension of the latch housing. If not, the tubular pin is probably crooked or the hole in the latch worn.

When fitting the release valve (9) the spring (10) must be turned with the rivet from the release valve.

**Note**

**Make sure that the cylindrical pin (12) does not catch in the thread and can easily be moved in its slot.**

**Note**

**Lubricate the core barrel head with grease every time it is taken up.**

Use enough grease to ensure that fresh grease is pressed out through the bearing housing (18). Oil in the release valve through the hole at the landing ring (7). Wipe off all surplus grease.

If the release valve jams there is a reamer (part no. 300 025 325) to clean the release valve seat.

The landing ring core barrel head is fitted so that the hole is turned backwards on the bearing shaft (14). Fit the latch housing (5) [with spacer (6)] on the valve housing, and tighten. When fitting the bearing unit it should be noted that the thrust ball bearing (17) must be turned correctly for the grease to pass through the bearing.

**Note**

**The thrust ball bearing (17) washers have different hole diameters. The washer with the smallest hole diameter is fitted upwards.**



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# 5.1 List of spare parts – Core Barrel Head 601 222 790

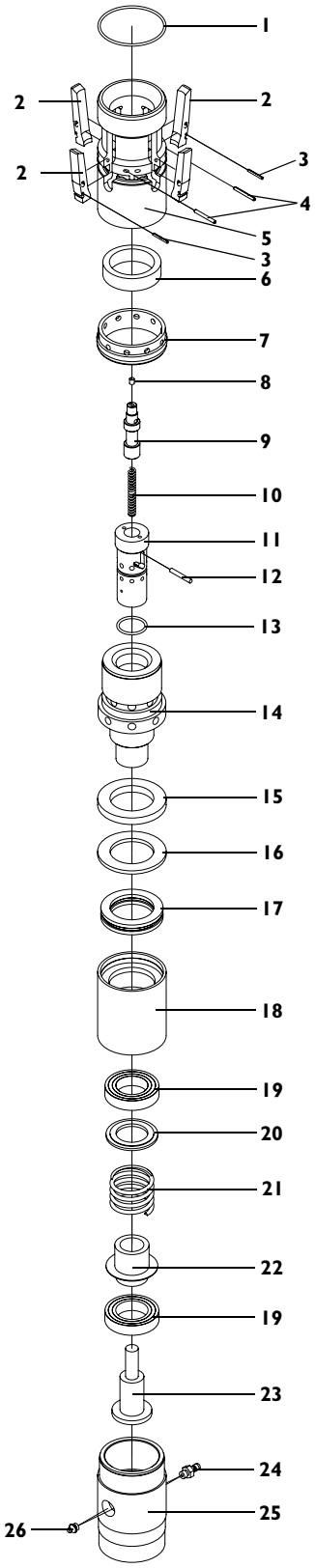



**Table 5: List of spare parts, Core Barrel Head**

| No. | Quantity | Part | Remarks | Part no. |
|---|---|---|---|---|
| 1 | 1 | O-ring | 59.5 x 3.0 | 300 012 695 |
| 2 | 4 | Latch | | 601 224 419 |
| 3 | 4 | Tubular pin | 4.0 x 36 | 300 020 157 |
| 4 | 4 | Tubular pin | 3.0 x 26 | 300 015 310 |
| 5 | 1 | Latch housing | | 600 222 784 |
| 6 | 1 | Spacer | | 601 222 782 |
| 7 | 1 | Landing ring core barrel head | | 601 222 785 |
| 8 | 1 | Stop screw | | 300 012 531 |
| 9 | 1 | Release valve | | 601 222 344 |
| 10 | 1 | Spring | | 601 222 378 |
| 11 | 1 | Valve housing | | 601 222 789 |
| 12 | 1 | Cylindrical pin | | 300 022 671 |
| 13 | 1 | O-ring | 32.2 x 3.0 | 300 012 688 |
| 14 | 1 | Bearing shaft | | 601 222 769 |
| 15 | 1 | Spacer | | 601 222 775 |
| 16 | 1 | Thrust washer | | 601 222 776 |
| 17 | 1 | Thrust ball bearing | | 300 011 140 |
| 18 | 1 | Upper bearing housing | | 601 222 788 |
| 19 | 2 | Radial ball bearing | | 300 011 139 |
| 20 | 1 | Washer | | 601 222 795 |
| 21 | 1 | Spring | | 301 011 142 |
| 22 | 1 | Bushing | | 601 222 783 |
| 23 | 1 | Screw | | 601 222 786 |
| 24 | 1 | Quick coupling | | 300 027 153 |
| 25 | 1 | Lower bearing housing | | 601 222 787 |
| 26 | 1 | Grease nipple | | 300 015 242 |

# 5.2 Functional description for pumping

In the core barrel head there is a release valve (9), see “List of spare parts, Core Barrel Head” on page 13, which before pumping in should be locked in a special pumping position. Insert a screwdriver in the latch housing, press the release valve forward and turn a quarter of a turn. The release valve will now be locked in its pumping position and the pumping in of the inner tube can now be started. When the inner tube is in position the water pressure increases powerfully and the flow of water is stopped. This is an indication that the inner tube is in it locked position. With the retention of the high water pressure for a few seconds the release valve will be pressed forward and released from its locked position. After the pump flow has been stopped and the water pressure completely drained, the spring will press the release valve upwards. This forms a free passage for the flushing water, and the pumping for the drilling can be started.

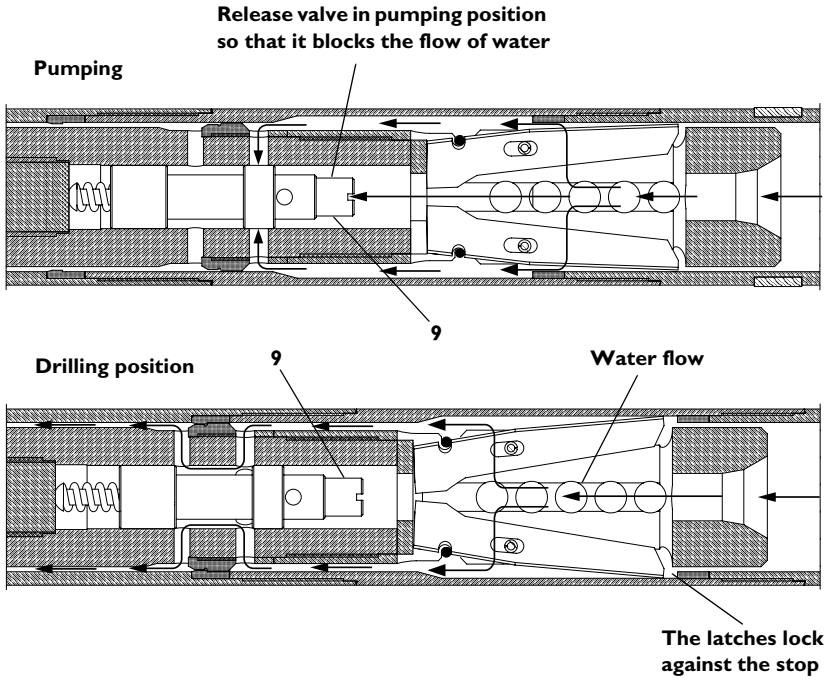
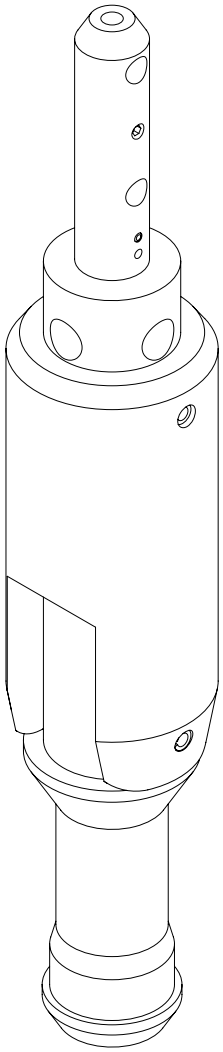



**Figure 2. Core barrel head**

# 6. Free Falling Overshot




Free falling overshot has part no. 601 222 794.

The numbers bellow, in brackets, correspond against the numbers in table “List of spare parts, Free Falling Overshot” on page 17.

The overshot has a swivel (1, 4, 5) in its upper end, which prevents the wire from twisting. A safety device [shear pin (3)] is built into the swivel and is intended to break at approx. 1.5 tons. This is to eliminate the risk of a cut wire being left in the hole.

**Remark**

**When double shear pins are fitted the breaking point load increases to approx. 3 tons.**

The wire is fitted in the wire clamp (1) and locked with three stop screws (2).

Fit the bearing shaft (5) in the bearing housing (4), then fix the wire clamp (1) on the bearing shaft (5) by means of the shear pin(s) (3). Lubricate the surfaces between bearing housing and wire clamp with grease. The bearing housing is then filled with grease before it is fitted on the wire weight by means of the tubular pin (8).

The shear pins should be replaced at regular intervals.

When the lifting tip (11) moves down into the core barrel head, the latches will be released from the locking ring. When the lifting tip have passed the latches, the inner core barrel will be locked against the overshot and the inner core barrel can be hoisted up by the wire.

**Note**

**When the edge of the lifting tip begins to be worn the lifting tip should be replaced.**

# 6.1 List of spare parts – Free Falling Overshot 601 222 794

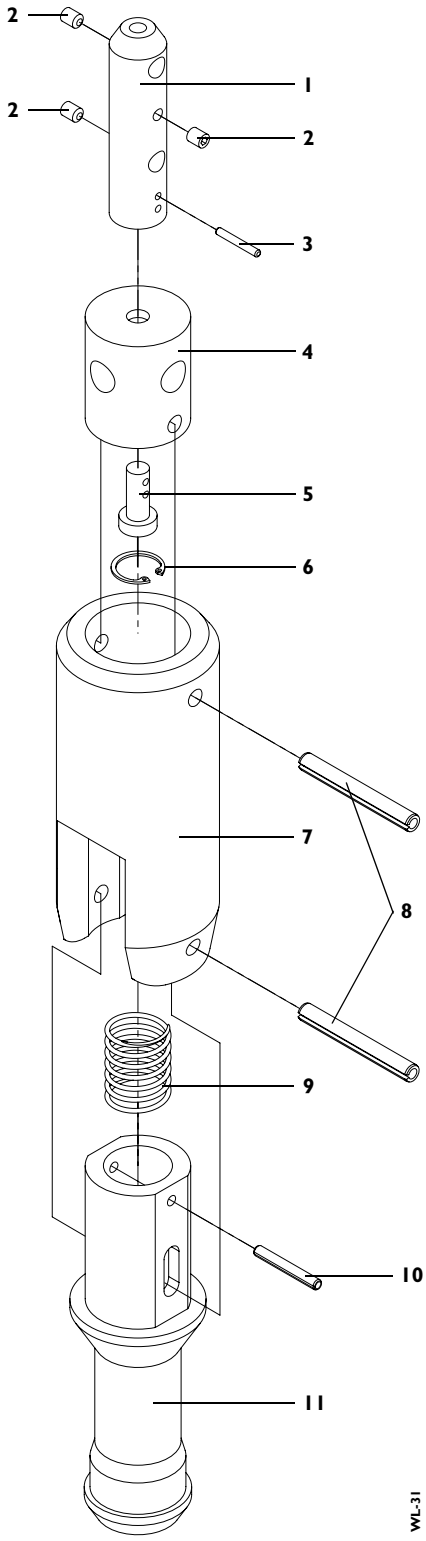



**Table 6: List of spare parts, Free Falling Overshot**

| No. | Quantity | Part | Part no. |
|---|---|---|---|
| 1 | 1 | Wire clamp | 601 222 729 |
| 2 | 3 | Stop screw | 300 027 148 |
| 3 | 1* | Shear pin | 300 025 423 |
| 4 | 1 | Bearing housing | 601 222 791 |
| 5 | 1 | Bearing shaft | 601 222 728 |
| 6 | 1 | Lock ring | 300 011 143 |
| 7 | 1 | Wire weight | 601 222 792 |
| 8 | 2 | Tubular pin | 300 011 157 |
| 9 | 1 | Spring | 300 011 141 |
| 10 | 1 | Tubular pin | 300 015 971 |
| 11 | 1 | Lifting tip | 601 222 793 |

* If necessary two shear pins can be used.

# 7. Wireline 103/80, Component Parts

## Drill bit 102.5 - 80, Reaming shell 102.8, Drill rod 98 - 88.8 mm

**Table 7: Wireline 103/80, Component parts**

| Component Parts | Part no. |
|---|---|
| Core barrel, complete WL103 x 1500 | 601 222 748 |
| Core barrel, complete WL103 x 3000 | 601 222 749 |
| | |
| Outer tube, complete WL103 x 1500 | 601 222 750 |
| Outer tube, complete WL103 x 3000 | 601 222 751 |
| | |
| Inner tube, complete WL103 x 1500 | 601 222 752 |
| Inner tube, complete WL103 x 3000 | 601 222 753 |
| | |
| Core barrel head, complete WL103 | 601 222 790 |
| Free falling overshot for downward hole, complete | 601 222 794 |
| Water swivel | 501 012 140 |
| Adapter, water swivel | 501 222 824 |
| | |
| Drill rod WL103, 98 x 1500 | 601 222 766 |
| Drill rod WL103, 98 x 3000 | 601 222 767 |
| | |
| Adapter WL103 box x 113 pin | 501 222 821 |
| Adapter WL103 box x WL73 pin | 501 222 822 |
| Adapter WL103 pin x WL73 box | 501 222 823 |